

What is claimed is:

1. An optical element module comprising:
a base part to which a predetermined reference optical axis is relatively fixed;
5 an optical element positioned with respect to said reference optical axis, being
out of contact with said base part; and
solder interposed between said optical element and said base part, for fixing said
optical element onto said base part.
- 10 2. The optical element module according to claim 1, wherein
said base part is a part which is fixed to another optical element which
determines said reference optical axis.
3. The optical element module according to claim 2, wherein
15 said optical element is a collimator lens.
4. The optical element module according to claim 3, wherein
said another optical element is a semiconductor light emitting element.
- 20 5. The optical element module according to claim 2, wherein
said another optical element is an optical waveguide element.
6. The optical element module according to claim 2, wherein
said optical element is a lens included in a microlens array.

7. The optical element module according to claim 6, wherein
said another optical element is an optical waveguide element.

5 8. The optical element module according to claim 1, wherein
said optical element is an optical fiber.

9. An optical element module comprising:
a base part to which a plurality of reference optical axes are relatively fixed;
a plurality of optical elements which are positioned with respect to said plurality
10 of reference optical axes, respectively, being out of contact with said base part; and
solder interposed between each of said plurality of optical elements and said base
part, for fixing each of said optical elements to said base part.

15 10. The optical element module according to claim 9, wherein
each of said plurality of optical elements is an optical fiber.

11. The optical element module according to claim 9, wherein
said plurality of reference optical axes are respective axes of lenses in a
microlens array.

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12. An apparatus for fixing an optical element onto a base part, comprising:
a holding part for holding a base part to which a bonding agent for fixing a first
optical element is applied;
a supporting part which supports said first optical element while moving the
25 same to said base part and is removed from said first optical element after fixing;

a light receiving part for receiving a reference light emitted from said first optical element or a second optical element attached onto said base part;

a mechanism for moving or rotating said supporting part relatively to said holding part; and

5 a control part for positioning said first optical element at a position with respect to said second optical element on the basis of an output from said light receiving part.

13. The apparatus according to claim 12, wherein
said control part controls a position of said first optical element in course of
10 hardening of said bonding agent.

14. The apparatus according to claim 12, wherein
said first optical element is a collimator lens.

15 15. The apparatus according to claim 14, wherein
said second optical element is a semiconductor light emitting element for
emitting light towards said collimator lens.

16. The apparatus according to claim 12, wherein
20 said first optical element is a microlens array.

17. The apparatus according to claim 16, wherein
said second optical element is an optical waveguide element for emitting lights
towards said microlens array.

18. The apparatus according to claim 16, wherein

said second optical element is a semiconductor light emitting element for emitting a light towards said microlens array.

5 19. The apparatus according to claim 12, wherein

said first optical element is an optical fiber.

20. The apparatus according to claim 12, further comprising

a switching lens which is movable to and fro on an optical path, between said
10 light receiving part and a front optical element that is one of said first and second optical elements which is closer to said light receiving part,

wherein said front optical element is a lens and said front optical element and a light receiving surface in said light receiving part are optically conjugate to each other in a state where said switching lens is disposed on said optical path.

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21. An apparatus for fixing an optical element onto a base part, comprising:

a holding part for holding a base part to which a bonding agent for bonding an optical element is applied;

a supporting part which supports said optical element while moving the same to
20 said base part and is removed from said optical element after fixing; and

a moving mechanism for moving or rotating said supporting part relatively to said holding part with respect to at least three axes.

22. The apparatus according to claim 21, wherein

25 said moving mechanism moves said supporting part relatively to said holding

part along three motion axes and rotates said supporting part relatively to said holding part around three rotation axes.

23. The apparatus according to claim 21, wherein
5 said optical element is one selected out of a group consisting of a semiconductor light emitting element, a collimator lens, a microlens array and an optical fiber.

24. The apparatus according to claim 21, further comprising
a temperature control part for controlling temperature of said supporting part,
10 wherein said supporting part supports said optical element with solder interposed therebetween.

25. The apparatus according to claim 21, wherein
said bonding agent is a bonding agent containing resin component, and
15 said apparatus further comprising
a mechanism for hardening said bonding agent on said base part.

26. The apparatus according to claim 21, wherein
said bonding agent is glass powder or solder, and
20 said apparatus further comprising
another temperature control part for controlling temperature of said holding part.

27. An apparatus for fixing an optical element onto a base part, comprising:
a holding part for holding a base part to which a bonding agent for fixing an
25 optical element is applied;

a supporting part which supports said optical element while moving the same to said base part and is removed from said optical element after fixing;

a light receiving part for receiving a reference light emitted from said optical element;

5 a mechanism for moving or rotating said supporting part relatively to said holding part; and

a control part for positioning said optical element at a position with respect to said base part on the basis of an output from said light receiving part.

10 28. A method of fixing an optical element onto a base part, comprising the steps of:

supporting a first optical element by a supporting part and positioning said first optical element at a predetermined position with respect to a base part;

15 receiving a reference light by a light receiving part, said reference light being emitted from said first optical element or a second optical element attached onto said base part;

positioning said first optical element at a position with respect to said second optical element on the basis of an output from said light receiving part;

20 fixing said first optical element onto said base part with a bonding agent; and removing said supporting part from said first optical element after fixing.

29. The method according to claim 28, wherein

a position of said first optical element is controlled in course of hardening of said bonding agent in said step of fixing.

30. A method of fixing an optical element onto a base part, comprising the steps of:

- supporting an optical element by a supporting part and moving or rotating said optical element with respect to at least three axes to position said optical element at a
- 5 predetermined position relatively to a base part;
- fixing said optical element onto said base part with a bonding agent; and
- removing said supporting part from said optical element after fixing.